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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

APR 24 1992

Federal Communications Commission
Office of the Secretary

In the Matter of)
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CONSTELLATION COMMUNICATIONS, INC.)
)
MOTOROLA SATELLITE)
COMMUNICATIONS, INC.)
)
Requests for Pioneer's Preferences)
to Establish Low Earth Orbit)
Satellite Systems in the 1610-)
1626.5 MHz and 2483.5-2500 MHz Bands)

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REPLY COMMENTS

Constellation Communications, Inc. ("Constellation"), by its attorneys, hereby files these Reply Comments to the Comments filed by Motorola Satellite Communications, Inc. ("Motorola") on April 8, 1992 in the matter captioned above.

Constellation is one of five applicants proposing a low earth orbit ("LEO") satellite system in the 1610-1626.5 MHz and 2483.5-2500 MHz bands allocated to the radiodetermination satellite service ("RDSS"), as well as to the mobile satellite service (MSS) by the 1992 World Administrative Radio Conference ("WARC).. Constellation has proposed an innovative LEO system that allows multiple LEO systems to share the same band, and has proposed a licensing scheme that allows the Commission to continue to apply its current competitive satellite licensing policies to LEO technology in the RDSS bands.

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I. Motorola Should Not Receive a Pioneer's Preference Because It has Not Demonstrated That Its System Is Economically Viable; and The Regulatory and Political Barriers to Entry Raised By Its System Design Make Implementation Impractical.

Motorola's initial application estimates a total system cost of approximately \$3.2 billion. Given the complexity of the Iridium system, the actual cost may approach two to three times this amount by the time it is fully implemented as described in the application. Considering that the expected system lifetime is only five to seven years, the annual revenue requirements to justify this investment will be enormous. The economic risks of the LEO satellite program described in Motorola's application are extremely high when all of the variables are considered. These risks must reflect such factors as the fact that the market is new to LEO satellite services, the absence of user terminal production and associated distribution/servicing networks, and the high technical risks of the Iridium system design. It is far from clear how Motorola will be able to achieve the kind of market penetration required to generate the necessary revenues.

The concerns over financial viability have international political implications as well. One issue is the prospect of using Iridium's intersatellite call routing system to bypass national networks. Another worldwide concern is that a

single system such as the Iridium system would limit the opportunities for participation by countries and their telecommunications entities, and that as a consequence their rights to access the spectrum and the mobile communications marketplace would be denied.¹

Finally, Motorola's proposed bi-directional use of the 1616-1626.5 MHz band will require country by country coordination which will be extraordinarily difficult in light of the high power density levels used in the Iridium system. These difficulties will be compounded by the basic conflict between operation of the Iridium system and the planned expansion of the Russian Glonass system to overlap the frequencies Motorola plans to use. These issues may render implementation of the Iridium system infeasible from a practical standpoint.

II. Motorola Should Not Be Awarded A Pioneer's Preference Because There Is Nothing Novel About It

Motorola claims that its plan to provide hand-held portable mobile communications with worldwide interconnectivity is a novel service offering. In fact, aside from Motorola's ability through intersatellite links to provide coverage of remote, mid-ocean locations, its Iridium system would contribute nothing that is not also proposed by the other applicants in this proceeding.

¹ These concerns are reflected in Resolutions COM5/8 and COM5/11 of the 1992 WARC.

All of the LEO applicants propose systems capable of supporting the same basic type of hand-held user terminals. In addition, Constellation and other LEO applicants propose worldwide coverage and interconnectivity through the public switched network. The decision not to use intersatellite links was based on practical business and technical considerations. Adequate service to aeronautical and maritime users in mid-ocean regions where no earth station is present can be provided by current geostationary satellite systems. Any novelty in such areas is far outweighed by the cost savings and reduced technical risk of not interlinking the satellites for call routing.

Further, while Motorola has patents on certain technologies it plans to use for Iridium, none of this patented technology is required or sought by any of the other LEO system applicants. Motorola's patents cover only limited aspects of its LEO system and have nothing to do with the merits of one technology for LEO systems versus another. Motorola's patents are therefore irrelevant to the consideration of a Pioneer's Preference in this proceeding. Moreover, the testing that Motorola has done does not appear to address the key elements which Motorola claims as the innovative aspects of its system. Propagation tests and demonstration of link closures are routine tests that would be performed by any system operator.

Moreover, all of the technology required to establish an economically efficient LEO system for voice, data and

positioning was developed, tested and applied in telecommunications systems long before Motorola conceived of Iridium. In fact, the use of satellite constellations to provide global coverage date back to 1963 with the U.S. Government's implementation of its Initial Defense Satellite Communications Program. While there have been significant refinements since then, and many of these are applied by Motorola in its Iridium proposal, none of the technologies to be used by Motorola can legitimately be considered novel.

Each of the examples of novel technologies cited by Motorola in its pleadings can be traced to earlier applications. Hand-held user terminals were developed in the cellular industry and modifications for satellite use were pioneered by Geostar Corporation and Defense Systems, Inc. Onboard switching technology was developed in NASA's Advanced Communications Technology Satellite (ACTS) program and for the latest generation of INTELSAT satellites. Intersatellite links were developed and are being used today in NASA's Tracking and Data Relay Satellite System (TDRSS). Handoff from one satellite to another is simply an extension of cellular technology, with the satellite as the cell site. Similarly, Motorola's bi-directional frequency use is no more than a fast, automated version of "push to talk" techniques that have been employed by communications systems for decades. Multiple beam antennas have been used by many satellite systems, Motorola's beam hopping is no more than a version of satellite switched, time division multiple access

which the Commission first saw in the Advanced Westar applications a decade ago. Power management is an inherent part of satellite systems operations, and doppler positioning is an obvious fallout of the LEO application itself.

Finally, Motorola claims that it has spent more than \$50 million since 1987 in research, development and promoting the advancement of the Iridium system design. It is not clear how much of this money has gone to engineering and how much to lobbying. In any event, these "pioneering efforts", as Motorola refers to them, have resulted in a system design that locks out any competition from the outset by requiring exclusive use of the best portion of RDSS spectrum. Such a design is contrary to long standing Commission policy, and Motorola's expenditures of time and resources should not be given weight by the Commission in evaluating its request for a pioneer's preference.

III. The Commission Should Not Use Its Pioneer's Preference Procedures to Select a "Winner" Among Competing Technologies

Throughout this proceeding, it has been made clear that the Commission is being presented with two basic competing technologies to implement LEO systems in the bands above 1 GHz.² Motorola proposes a time division duplex ("TDD"), time

² This same type of issue was presented by competing types of frequency division multiple access ("FDMA") and code division multiple access ("CDMA") LEO system designs in the bands below 1 GHz, and the Commission declined to favor one design approach over the other.

division multiple access ("TDMA") system design, while the other LEO applicants propose spread spectrum, code division multiple access ("CDMA") designs. The Motorola design approach requires an exclusive, world wide frequency assignment because the high power density levels required by a TDD/TDMA system precludes any other user to operate on the same frequency. On the other hand, the spread spectrum CDMA designs permit both multiple LEO systems and other radio services to operate in the same band.

This distinction prevents the Commission from granting Motorola a pioneer's preference without in effect selecting Motorola's TDD/TDMA technology as the "winning" LEO technology. In the case of CDMA systems, the Commission could grant one of the applicants a preference in the form of an early grant without precluding a later grant of other CDMA applications, particularly if it extends its current RDSS coordination procedures to LEO systems.³ The same is not true of Motorola's TDD/TDMA technology where the grant of a pioneer's preference is tantamount to a denial of the other applications for the frequencies assigned to Motorola because the Motorola system design does not permit sharing. There would be at least two major problems with such a decision by the Commission.

First, the Commission's licensing procedures should not be used to select among competing technologies, particularly

³ The Commission has apparently decided to encourage coordination among LEO applicants in bands below 1 GHz through the establishment of an industry advisory committee. See Public Notice, _____.

if the technology to be selected precludes sharing or competition. As a purely technical matter, both TDD/TDMA and CDMA may be feasible, and both may be used by LEO systems to provide voice, data and position determination to users with hand-held terminals. But whether one or the other technology will become dominant in the marketplace will depend on a wide range of other factors that determine market acceptance of a new service. The Commission's rulemaking and licensing procedures can not be used as a surrogate for such marketplace decisions, and the Commission has correctly refrained from intruding itself into similar controversies in other services, such as the current debate between TDMA and CDMA for cellular systems. The Commission should similarly refrain from granting Motorola a pioneer's preference that would effectively select Motorola's TDD/TDMA technology as the winning technology for LEO systems over CDMA technology.

Second, even if the Commission sought to select Motorola's TDD/TDMA technology as a "winner", it could not do so in the context of granting Motorola a pioneer's preference. Because Motorola's system precludes sharing⁴, the Commission must first compile an adequate record on which to base its decision to exclude other users from the band to

⁴ As Constellation demonstrated in its March __, 1992 Comments in this proceeding, Motorola's proposal that it be assigned the top 10.5 MHz of the RDSS L-band, with the remaining 6 MHz assigned to CDMA systems, is tantamount to denial of the CDMA applications because of the imbalance between uplink and downlink spectrum and because of the inability to access the upper part of the RDSS L-band to assist in sharing the band with other users to which the band is allocated.

be assigned to Motorola.⁵ However, there are still many unresolved questions of fact concerning the feasibility and superiority of the Motorola system which the Commission must address before it could legally select Motorola's TDD/TDMA approach as the "winning" technology. Consideration of these complex and contentious issues can not be done in the context of a pioneer's preference. Unlike CDMA technology, where the grant of a pioneer's preference does not preclude later grant of competing applications in the same band, the Commission can not pick Motorola's mutually exclusive TDD/TDMA design without first addressing all outstanding questions of fact in a manner that preserved the "Ashbacker" hearing rights of the other applicants.⁶ The Commission can not preserve these legal rights of competing applicants in the context of its consideration of Motorola 's request for a pioneer's preference.

Conclusion

The applications of Constellation and the other CDMA applicants offer the Commission the opportunity to promptly

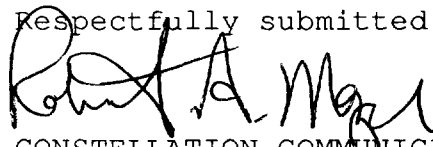
⁵ Moreover, since Motorola is claiming that its global coverage capabilities form one of the bases for a pioneer's preference, the Commission must also consider the foreign policy implications of selecting a technology that would effectively sanitize the band on a world wide basis because of the high power density levels employed by the Motorola system.

⁶ Where the Commission has found it necessary to establish detailed technical specifications for a new service, such as for high definition television, the Commission has embarked on lengthy rulemaking proceedings, aided by the establishment of advisory committees and an exhaustive testing program, before making a selection.

implement LEO technology in the RDSS bands in a way that allows marketplace forces to determine the optimum cost and size of the systems to be implemented. All of the LEO systems, including Motorola's, seek to provide the same basic services to handheld terminals. However, Motorola's TDD/TDMA system design presents high technical, financial and political risks and precludes any other user from operating on the frequencies assigned to it. The Commission is not in a position to select Motorola's technology to the exclusion

of CDMA technology by granting Motorola a pioneer's preference. The Commission must resolve all of the outstanding questions of fact surrounding the alleged feasibility and superiority of the Motorola system. Constellation is confident that such a detailed review will demonstrate the clear preference that the Commission should afford CDMA systems that allow multiple LEO systems to operate in the RDSS bands and continue the Commission's long standing policy preference for licensing policies that promote competition in the supply of satellite communications services.

Respectfully submitted

A handwritten signature in black ink, appearing to read "Robert A. Mazer", is written over the typed name and above the firm name.

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April 23, 1992.

CERTIFICATE OF SERVICE

I, Robert A. Mazer, hereby certify that a copy of the foregoing Reply Comments of Constellation Communications, Inc. was sent by first class United States mail, postage prepaid, this 23th day of April 1992, to the following:

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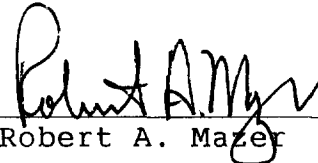
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